

101002,282

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,746,546 B2
DATED : June 8, 2004
INVENTOR(S) : Easterday et al.

Page 1 of 7

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Please replace the specification with the new attached specification including Figure 1.

Please replace Formal Drawings 1-5 with the attached drawings.

Column 7

Line 13, after "the" (first occurrence), delete the numeral "5".

This certificate supercedes certificate of correction issued November 23, 2004,

Signed and Sealed this

Third Day of May, 2005



JON W. DUDAS
Director of the United States Patent and Trademark Office

(12) United States Patent
Easterday et al.(10) Patent No.: US 6,746,546 B2
(45) Date of Patent: Jun. 8, 2004(54) LOW TEMPERATURE NITRIDING SALT
AND METHOD OF USE(75) Inventors: James R. Easterday, Bloomfield Hills,
MI (US); John F. Pilznienski,
Dearborn Heights, MI (US)

(73) Assignee: Koleen Corporation, Detroit, MI (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 135 days.

(21) Appl. No.: 10/002,282

(22) Filed: Nov. 2, 2001

(65) Prior Publication Data

US 2003/0084963 A1 May 8, 2003

(51) Int. Cl.⁷ C23C 8/26(52) U.S. Cl. 148/228; 148/229; 148/240;
148/242; 148/274(58) Field of Search 148/228, 229,
148/240, 242, 274; 252/390

(56) References Cited

U.S. PATENT DOCUMENTS

3,303,063 A	2/1967	Pietryka	.....	148/15.5
3,21,338 A	5/1967	Cabot et al.	.....	148/217
3,912,547 A	10/1975	Gancher et al.	.....	148/6.11
4,019,928 A	4/1977	Beyer et al.	.....	148/15.5
4,184,899 A	1/1980	Blas et al.	.....	148/228
4,292,004 A	9/1981	Kunst et al.	.....	148/217
4,492,604 A	1/1985	Muller et al.	.....	148/228
4,717,429 A	1/1988	Kunst et al.	.....	148/28
5,518,605 A	5/1996	Hadj-Rabah et al.	.....	205/148

FOREIGN PATENT DOCUMENTS

EP 1055739 A2 5/2000 C21D/9/50

GB 1105031 3/1965 C23C 8/14

OTHER PUBLICATIONS

"Plasma Nitriding of Stainless Steels at Low Temperatures",
B. Larisch et al, Technical University Freiberg, pp. 221-228.

"The Response of Austenitic Stainless Steels to Low-temperature Plasma Nitriding", Y. Sun et al, Heat Treatment of Metals, 1999, pp. 9-16.

"Influence of the Steel Composition and Treating Parameters on the Properties of Nitrocarburized Components", G. Wah 1989.

* cited by examiner

Primary Examiner—Andrew L. Olimans

(74) Attorney, Agent, or Firm—William N. Hogg

(57)

ABSTRACT

A composition for nitrocarburizing stainless steel parts and a method for producing a nitride or hard case on such parts using the composition, are provided. The composition includes alkali metal cyanate and alkali metal carbonate, wherein the cyanate ion is present in a weight percentage of greater than 45% and less than 55.2%. The composition is fused and maintained between about 750° F. and about 950° F. depending upon the type of stainless steel to be treated. The workpiece is immersed in the fused bath and left in until a satisfactory compound layer or case is formed. With austenitic stainless steel, the piece is immersed from about four hours to about six hours at temperatures between about 750° F. and about 950° F., preferably between 750° F. and 850° F. to maintain corrosion resistance.

With 400 series stainless steel, increased corrosion resistance is achieved by immersion for between four and six hours at 950° F.

2 Claims, 5 Drawing Sheets

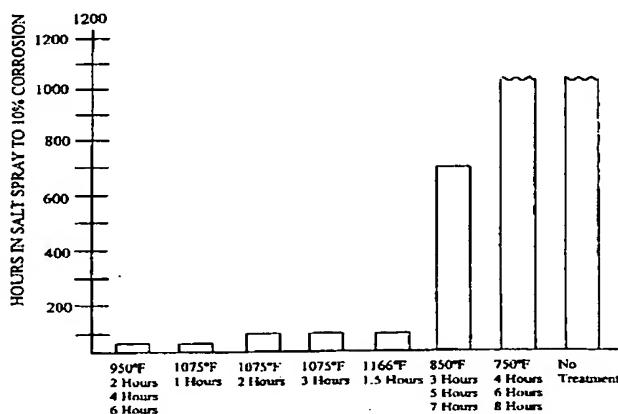


Fig 1

U.S. Patent

Jun. 8, 2004

Sheet 1 of 5

6,746,546 B2

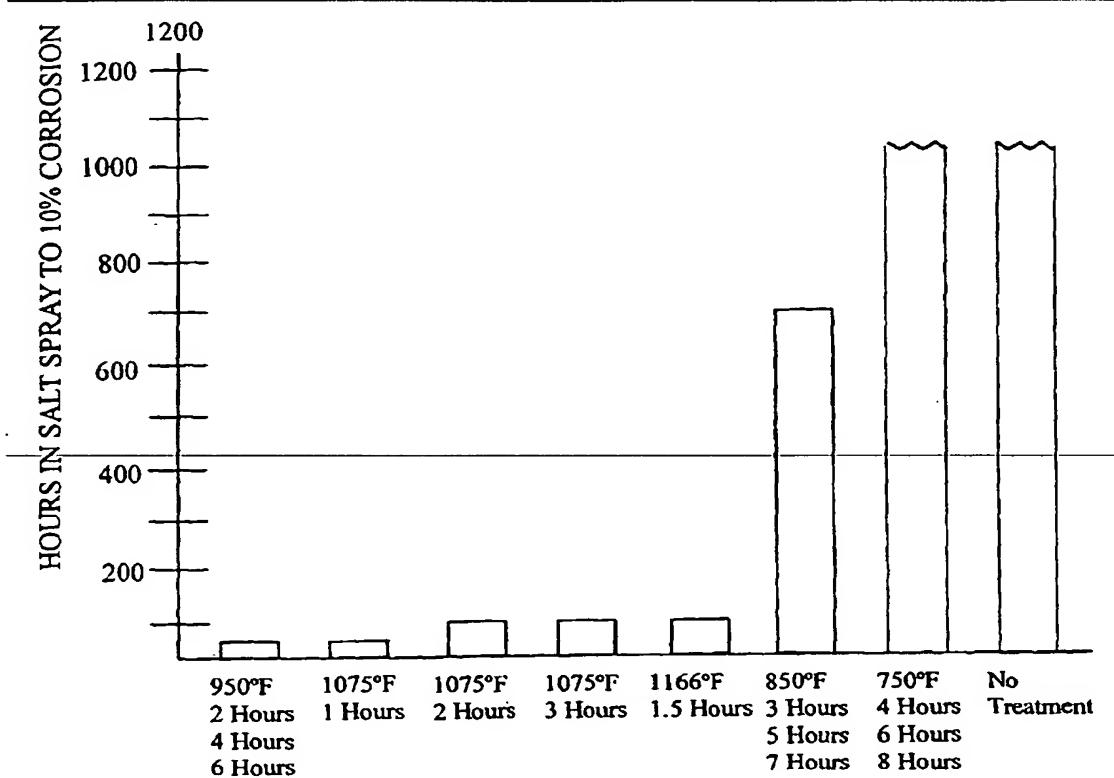


Fig 1

U.S. Patent

Jun. 8, 2004

Sheet 2 of 5

6,746,546 B2

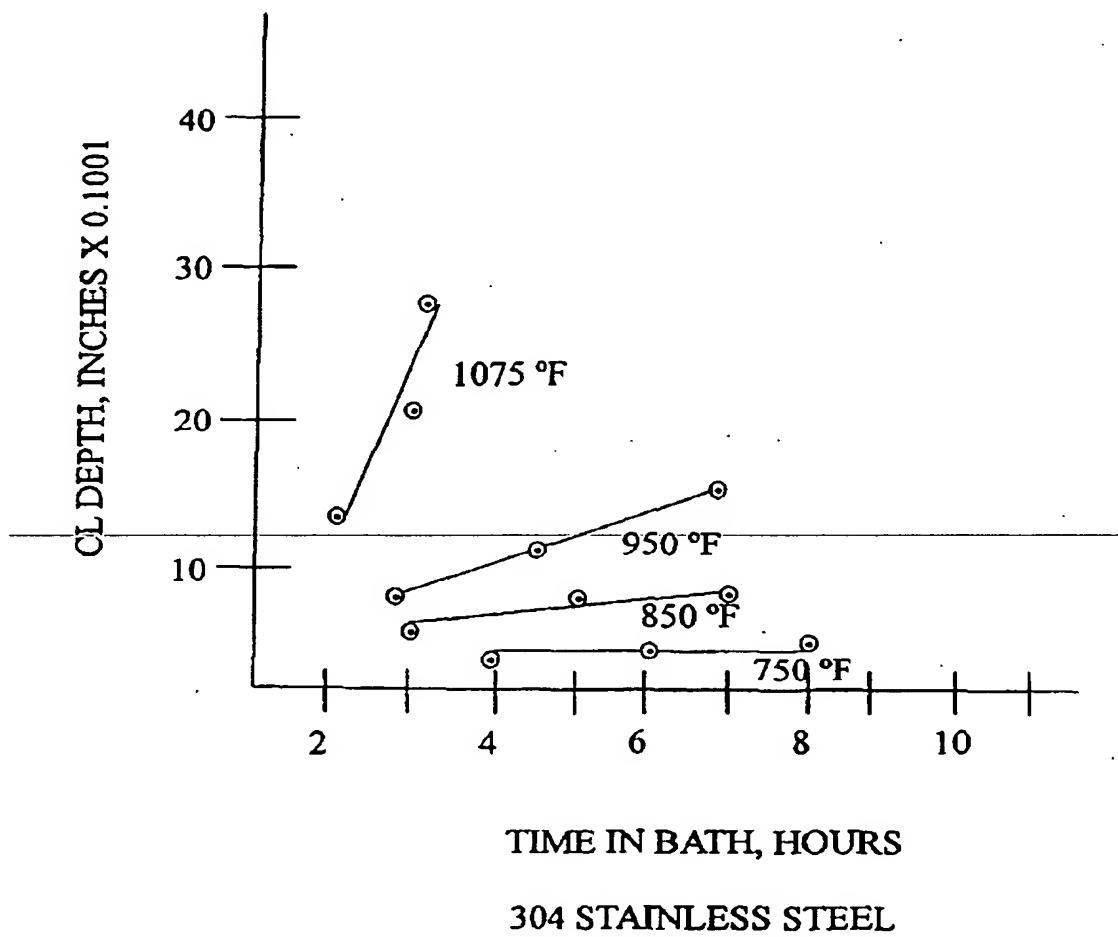
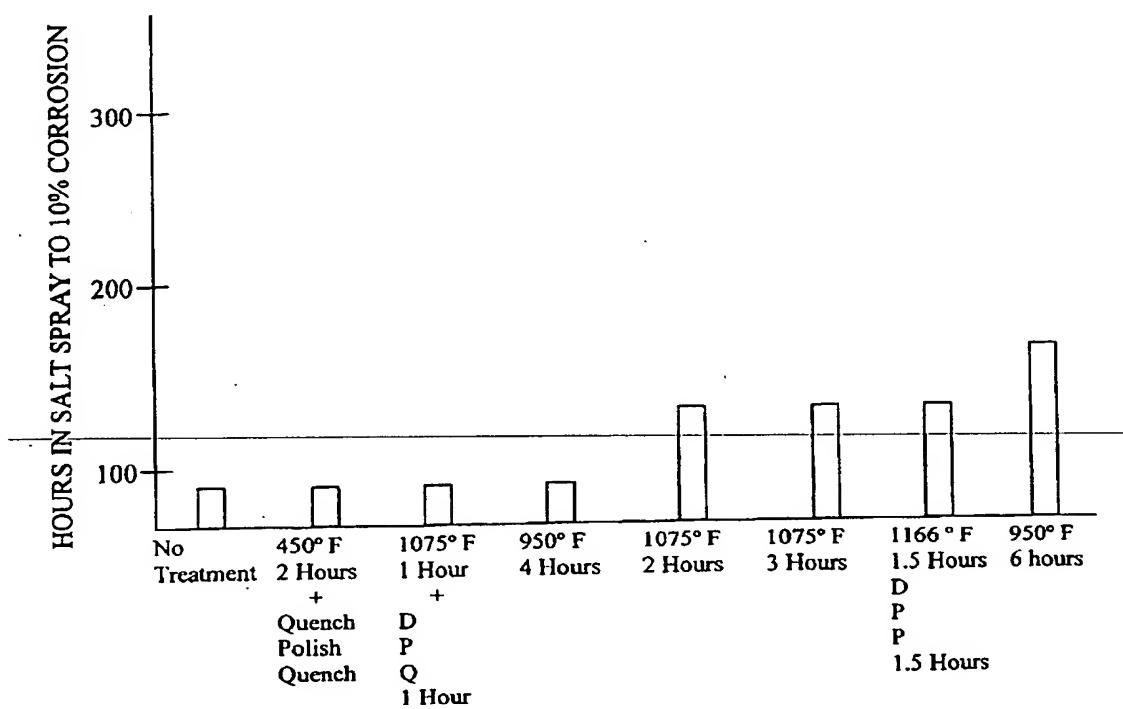


Fig 2

U.S. Patent

Jun. 8, 2004

Sheet 3 of 5

6,746,546 B2

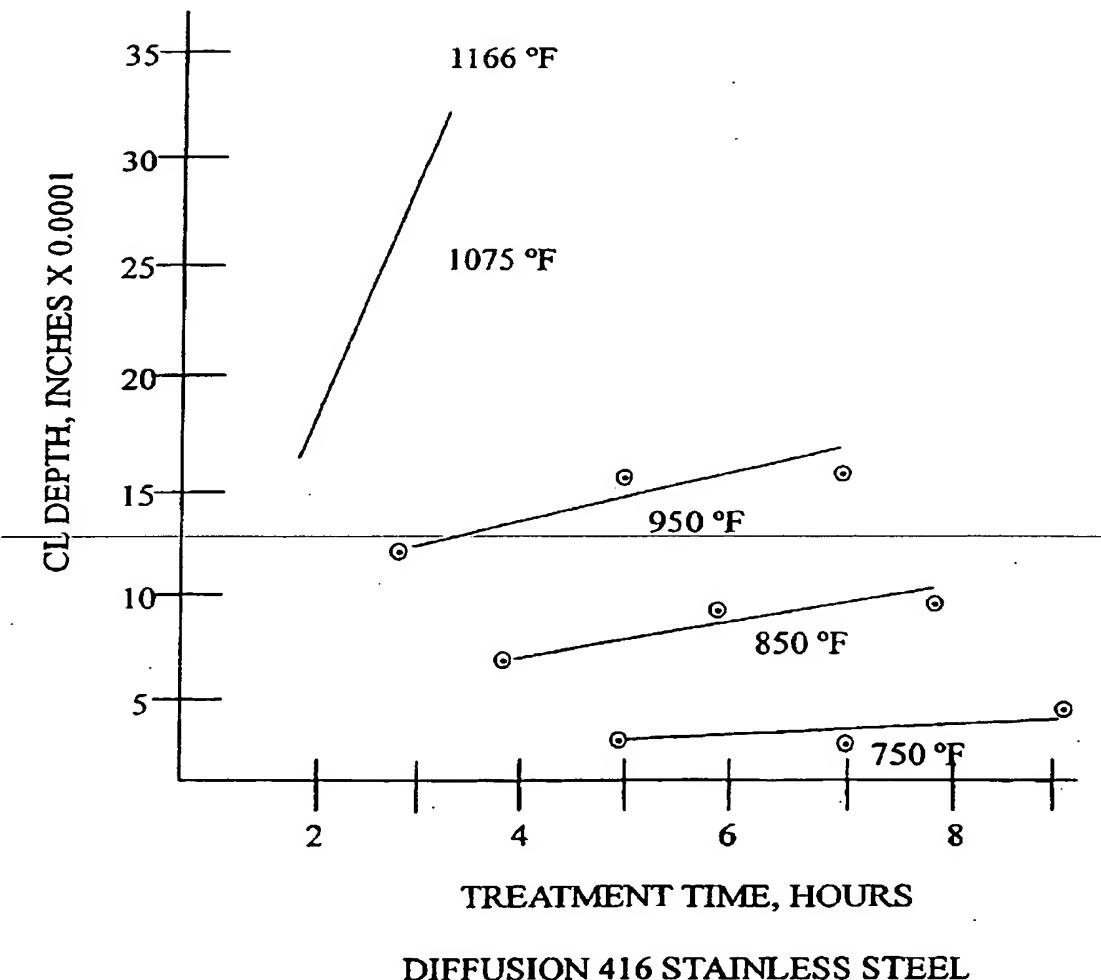
4/6 STAINLESS STEEL

Fig 3

U.S. Patent

Jun. 8, 2004

Sheet 4 of 5

6,746,546 B2**Fig 4**

U.S. Patent

Jun. 8, 2004

Sheet 5 of 5

6,746,546 B2

INFLUENCE OF SBM TEMPERATURE ON
CORE HARDNESS OF PRE HARDENED
AND TEMPERED 41655

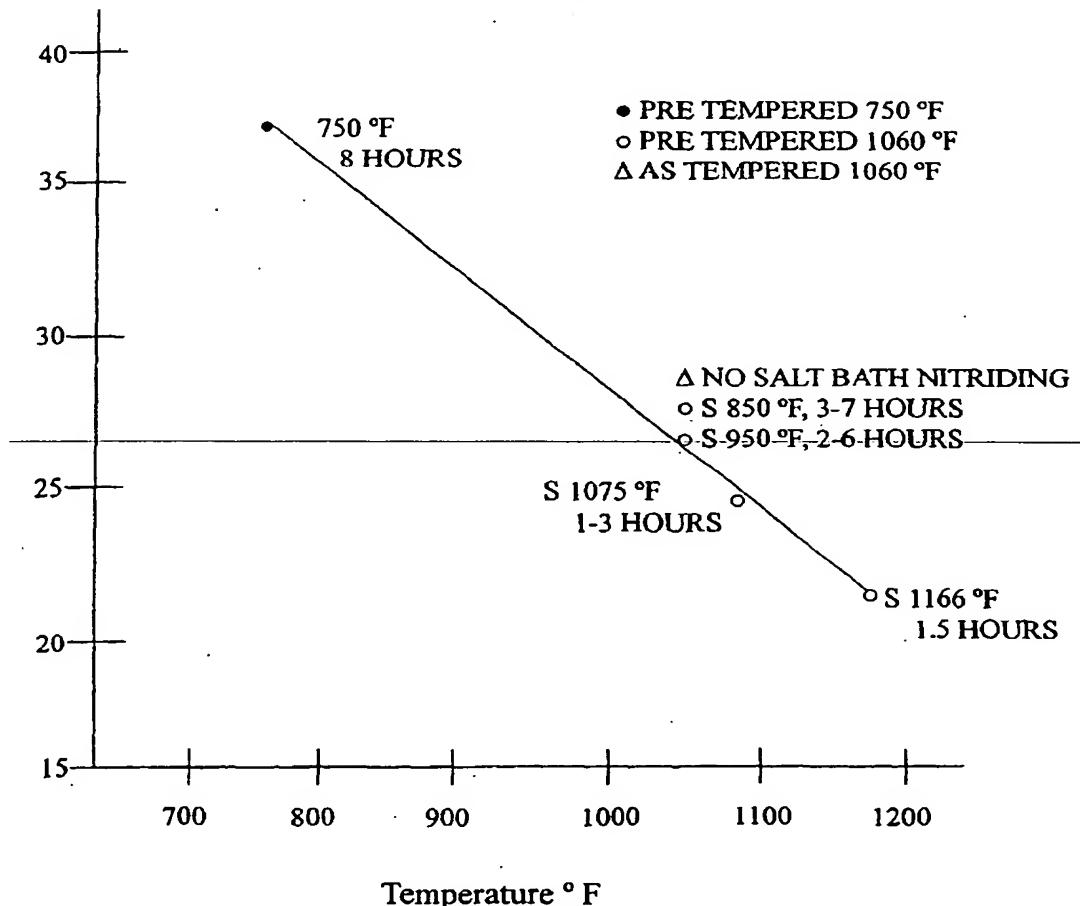


Fig 5